clinically useful but were not obtained in this study.15 27 Prior studies have shown E/Ea ratio to be more accurate than flow propagation in predicting filling pressures than flow propagation.15

CONCLUSIONS

Patients with LVNC have significantly different tissue Doppler profiles than normal controls. Tissue Doppler velocities, specifically the lateral mitral Ea velocity, may help discriminate patients with LVNC at potential risk of death, need of cardiac transplantation and hospitalisation for the management of congestive heart failure. It is important to highlight that such variables be taken into account in concert with older more established measures of left ventricular systolic function such as ejection fraction. Equally important is the search for other measures of ventricular systolic and diastolic function such as strain and strain rate imaging in children with cardiomyopathy.

Authors' affiliations

Colin J McMahon, Ricardo H Pignatelli, Santiago O Valdes, John P Kovalchin, J Lynn Jefferies, William J Dreyer, Susan W Denfield, Sarah Clunie, Jeffrey A Towbin, Lillie Frank Abercrombie Section of Pediatric Cardiology, Texas Children's Hospital, Baylor College of Medicine, Houston, Texas, USA

Sherif F Nagueh, Department of Cardiology, Section of Medicine, Methodist Hospital, Baylor College of Medicine, Houston, Texas, USA Vei-Vei Lee, William Vaughn, Department of Biostatistics and Epidemiology, Texas Heart Institute and St Luke's Episcopal Hospital, Baylor College of Medicine, Houston, Texas, USA

Benjamin W Eidem, Division of Pediatric Cardiology, Mayo Clinic College of Medicine, Rochester, Minnesota, USA

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REFERENCES

- Towbin JA, Bowles NE. The failing human heart. Nature 2002;415:227-33.
- Chin TK, Perloff JK, Williams RG, et al. Isolated left ventricular myocardium. A study of eight cases. Circulation 1990;82:507-13.
- Richardson P, McKenna W, Bristow M, et al. Report of the 1995 World Health Organization/International Society and Federation of Cardiology Task Force on the definition and classification of cardiomyopathies. Circulation 1996:93:841-2
- 4 Jenni R, Goebel N, Tartini R, et al. Persisting myocardial sinusoids of both ventricles as an isolated anomaly; echocardiographic, angiographic and pathologic anatomical findings. *Cardiovasc Intervent Radiol* 1986;**9**:127–31. **Oechslin EN**, Attenhofer Jost CH, Rojas JR, et al. Long-term follow-up of 34 adults
- with isolated left ventricular noncompaction: a distinct cardiomyopathy with poor prognosis. J Am Coll Cardiol 2000;36:493-500.
- 6 Ichida F, Hamamichi Y, Miyawaki T, et al. Clinical features of isolated noncompaction of the ventricular myocardium: long-term clinical course,

- hemodynamic properties, and genetic background. J Am Coll Cardiol 1999;**34**:233-40.
- 7 Stollberger C, Finsterer J. Left ventricular hypertrabeculation/noncompaction. J Am Soc Echocardiogr 2004;17:91-100.
- 8 Stollberger C, Finserer J, Blazek G. Left ventricular hypertrabeculation/ noncompaction and association with additional abnormalities and neuromuscular disorders. Am J Cardiol 2002;90:899-902.
- Neudorf UE, Hussein A, Trowitzsch E, et al. Clinical features of isolated noncompaction of the myocardium in children. Cardiol Young 2001;11:439-42.
- 10 Pignatelli RH, McMahon CJ, Dreyer WJ, et al. Clinical characterization of left ventricular noncompaction cardiómyopathy in children: a relatively common form of cardiomyopathy. Circulation 2003;108:2672-8.
- 11 Eriksson MJ, Sonnenberg B, Woo A, et al. Long-term outcome in patients with apical hypertrophic cardiomyopathy. J Am Coll Cardiol 2002;39:638–45.
- 12 Matsumura Y, Elliott PM, Virdee MS, et al. Left ventricular diastolic function assessed using Doppler tissue imaging in patients with hypertrophic cardiomyopathy: relation to symptoms and exercise capacity. Heart 2002 **87** · 247 – 51
- 13 McMahon CJ, Nagueh SF, Pignatelli RH, et al. Characterization of left ventricular diastolic function by tissue Doppler imaging and clinical status in children with hypertrophic cardiomyopathy. *Circulation* 2004;109:1756-62.
- 14 McMahon CJ, Nagueh SF, Eapen R, et al. Predictors of adverse clinical events in children with dilated cardiomyopathy: a prospective clinical study. Heart 2004;90:908-15.
- 15 Nagueh SF, Lakkis NM, Middleton KJ, et al. Doppler estimation of left ventricular filling pressures in patients with hypertrophic cardiomyopathy. Circulation 1999;99:254-61.
- 16 Silverman NH, ed. Quantitative methods to enhance morphological information using ultrasound [chapter 2]. *Pediatric echocardiography*. Baltimore: Williams & Wilkins, 1993:35–108.
- 17 Silverman NH, Ports TA, Snider AR, et al. Determination of left ventricular volume in children: echocardiographic and angiographic comparisons. Circulation 1980:62:548-57
- 18 Mulvagh S, Quinones MA, Kleiman NS, et al. Estimation of left ventricular enddiastolic pressure from Doppler transmitral flow velocity in cardiac patients independent of systolic performance. J Am Coll Cardiol 1992; 20:112–19.
- 19 Harada K, Tamura M, Toyono M, et al. Comparison of right ventricular Tei index by tissue Doppler imaging to that obtained by pulse Doppler in children without heart disease. Am J Cardiol 2002;90:566-9.
- 20 Kuecherer HF, Muhiudeen IA, Kusumoto FM, et al. Estimation of mean left atrial pressure from transesophageal pulsed Doppler echocardiography of pulmonary venous flow. *Circulation* 1990;**82**:1127–39.
- 21 Nagueh SF, Middleton KJ, Kopelen HA, et al. Doppler tissue imaging: a noninvasive technique for evaluation of left ventricular relaxation and estimation of filling pressures. J Am Coll Cardiol 1997;30:1527-33.
- 22 Cox DR, Oakes D. Analysis of survival data. London: Chapman and Hall, 1984.
- 23 Pepe MS. The statistical evaluation of medical tests for classification and prediction. UK: Oxford University Press, 2003:67-92.
- 24 Nugent AW, Daubeney PE, Chondros P, et al. National Australian Childhood Cardiomyopathy Study. The epidemiology of childhood cardiomyopathy in Australia. N Engl J Med 2003;348:1639–46.
- 25 Lipshultz SE, Sleeper LA, Towbin JA, et al. The incidence of pediatric cardiomyopathy in two regions of the United States. N Engl J Med 2003;348:1647–55.
- 26 Garcia MJ, Ares MA, Asher C, et al. An index of early left ventricular filling that combined with peak E velocity may estimate capillary wedge pressure. J Am Coll Cardiol 1997;**29**:448–54.
- 27 Border WL, Michelfelder EC, Glascock BJ, et al. Color M-mode and Doppler tissue evaluation of diastolic function in children: simultaneous correlation with invasive indices. J Am Soc Echocardiogr 2003;16:988-94.

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